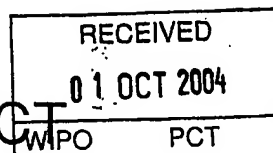


# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY



To:

see form PCT/ISA/220

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/GB2004/001301

International filing date (day/month/year)  
24.03.2004

Priority date (day/month/year)  
25.03.2003

International Patent Classification (IPC) or both national classification and IPC  
G06F3/00

Applicant  
BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1 (a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/001301

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/GB2004/001301

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**Box No. II Priority**

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1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

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**Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	26
	No: Claims	1-25,27-66
Inventive step (IS)	Yes: Claims	-
	No: Claims	1-66
Industrial applicability (IA)	Yes: Claims	1-66
	No: Claims	

2. Citations and explanations

**see separate sheet**

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**Box No. VI Certain documents cited**

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1. Certain published documents (Rules 43*bis*.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

**see form 210**

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB2004/001301

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:
  - D1: WO 01/27879 A (ELECTRONIC ARTS INC) 19 April 2001 (2001-04-19)
  - D2: SATO J ET AL: "Autonomous behavior control of virtual actors based on the AIR model" COMPUTER ANIMATION '97 GENEVA, SWITZERLAND 5-6 JUNE 1997, LOS ALAMITOS, CA, USA, IEEE COPUT. SOC. P, US, 5 June 1997 (1997-06-05), pages 113-118, XP010227328 ISBN: 0-8186-7984-0
  - D3: US-B-6 212 5021 (BREESE JOHN S ET AL) 3 April 2001 (2001-04-03)
  - D4: EP-A-0 978 790 (YAMAHA HATSUDOKI K.K.) 9 February 2000 (2000-02-09)
2. The application does not meet the requirements of Article 6 PCT, because claims 1, 29, 31, 32, 34 and 35 are not clear.
  - 2.1. Although independent method claims 1, 29, 31, 32, 34 and 35 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT. The relevant subject-matter would more appropriately be defined in terms of a single independent claim per category, followed by dependent claims covering features which are merely optional.
3. The subject-matter of claims 1, 29, 31, 32, 34, 35 and 42 does not meet the requirements of Article 33(2) PCT because it is not novel with respect to document D1.
  - 3.1. A method of generating behaviour for an object under the control of a behavioural controller combining all technical features of claims 1, 34, 35 and 42 is known from D1.

The system of D1 describes a behavioural framework whereby user inputs can include instantaneous information to be communicated to a recipient, a selection of a personality or personality characteristics of a virtual actor whose behaviour is to be generated and mood settings determining levels of intensity of behaviour parameters. The system generates behavioural actions by computing parameter values associated with the different settings and inputs according to a framework.

Interpreting the term "node" to refer to an instance in the framework of input, mapping of values or output, the method of D1 comprises:

- at least one node receiving input associated with a behavioural action (eg. page 11, lines 16-17, user inputs an utterance)
- inferring a plurality of behavioural parameter values in accordance with a behavioural framework for other nodes in the framework using said output ("the text communicated by the sender is analyzed for its content" see eg. page 11, lines 17-20)
- mapping the received input using said inferred behavioural parameter values to provide output by the behavioural controller which generates equivalent behaviour by the object (page 11, lines 20-27)

3.2. A method of controlling behaviour of an articulate object comprising all technical features of claim 29 is known from D1.

D1 describes a system in which the user may use various control bars to assign values to behavioural parameters. The user may define a virtual actor as having a particular personality (using for example the user interface of figure 7), the user may then set a mood intensity using a sliding bar (see eg. fig. 9a; page 18, line 26 - page 19, line 6). The system then uses preset (i.e. "default") weightings to determine from the user assigned parameter values, the degree of use of different behavioural actions. This information is then used in co-operation with eg. text information to be communicated, to generate the displayed behaviour of the virtual character.

- 3.3. A method of directly manipulating an object to control its behaviour comprising all technical features of independent claim 31 is known from D1.

Document D1 discloses a system in which the user may input directly a text to be spoken by the virtual character (eg. "Hello", see page 12, lines 15-27). This information of the spoken aspect of character behaviour is then provided as an input to analysis software in a behavioural framework. The behavioural framework "maps the input within the behavioural framework to derive parameter values for other behavioural nodes" when it analyses the input phrase to determine its meaning or social significance (see eg. page 25, lines 1-6: "quantifying and qualifying gesticulatory triggers" such as that an input phrase has a positive meaning), then uses parameters of the framework ("rule mapping" eg. the user has chosen his character to be an introverted personality type see eg. page 25, lines 14-19) to map the determined meaning of the words to infer output values which generate a behavioural movement which may then be displayed on the recipient's display screen (eg. page 23, lines 23 - 28).

Preventively, it is noted that even if the features of claim 31 were further to specify that the visual appearance, gestures or movement of the object is directly manipulated, rather than its speech output, this feature would not contribute to an inventive step in the light of D1. The virtual actors of D1 have various aspects of behaviour used to communicate: speech, facial movements, body movements. It would be clear to the person skilled in the art that these can all be specified directly by the user and mapped to generate equivalent behaviour interchangeably. For example, D1 discloses that a user can directly input a gesture to a virtual actor (eg. page 11, lines 5-13). It would be obvious to the person skilled in the art that the same technique used to map words of speech to facial or body movements would be used to map, for example, facial movements to body movements. So, a user direct input of the command "wave" might be translated to generate corresponding equivalent facial movement of a smile or a nod.

Moreover, various equivalent means of direct input or manipulation by the user are known to the person skilled in the art and would be routinely employed in a system such as that of D1. Therefore, it would involve no inventive step to specify that the direct manipulation of the virtual object is carried out using a cursor to position limbs of the virtual actor, rather than inputting a command "wave".

- 3.4. A method of inferring internal parameter values for an object comprising all technical features of independent claim 32 is also known from D1.

In one embodiment (see page 19, line 20 - page 20, line 4) the method of D1 describes a method by which the mood parameters for an individual, used for controlling overall behavioural action generation, are determined by feedback inferred from the manner of inputs detected from the user.

This method involves receiving input representing behavioural actions (eg. user chatting frequently and in volume (page 19, line 22)), inferring output values corresponding to an equivalent behaviour by object (transmitting to a recipient the communication input by the user with additional behaviour generation according to the method of D1) and inferring values for internal parameters from the set of output values (page 19, line 31 - page 20, line 3).

4. Furthermore, the subject-matter of claims 1, 34, 35 and 42 is also known from D2.
- 4.1. Document D2 discloses a method of generating behaviour for an object under the control of a behavioural controller involving:
- at least one node receiving input associated with a behavioural action (see page 113, left column, lines 31-33, which refers to an external stimulus input to a virtual actor, and page 114, left column, section 3. point 1. which gives the example of the behaviour of another virtual actor acting as an external stimulus);
  - the node maps received input to output (application of "emotional rules", see figure 1 and page 114, section 3.2);
  - inferring a plurality of behavioural parameter values in accordance with a behavioural framework for other nodes in the framework using said output (page 113, right column, lines 13-15: "The values of the parameters are mutually adjusted based on the emotion rule as a result of the communication between actors");

- mapping the received input using said inferred behavioural parameter values to provide output by the behavioural controller which generates equivalent behaviour by the object (see eg. page 114, section 3. points 4., 5. and 6.; page 115, table 2. and page 116, section 4 which discusses the author's choice of the motions "walk" as a moving action, "shake hands" as a FRIENDLY action and "hit" as an ANTIPATHY action).

Hence, the subject-matter of claims 1, 34, 35 and 42 is also known from D2.

5. Dependent claims do not contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of Article 33(2)&(3) PCT with respect to novelty and inventive step respectively.
  - 5.1. The additional features of claims 2-4 relate to a behavioural framework with an internally flexible structure and a hierarchy of nodes. These claims seem to refer to the behavioural framework utilising eg. Bayesian or neural networks (see the description, page 38, line 5 - page 39, line 4). The application of Bayesian or neural networks to such a behavioural framework for generating and analysing behaviour of a virtual character is well known in the art (see eg. D3, column 4, line 55 - column 5, line 48).
  - 5.2. The additional feature of claim 5 is that parameter values are determined by a combination of behavioural action inputs. This is known from D2 (see D2, section 3.2).
  - 5.3. The additional features of claims 6, 44, 47, 53 and 57 relate to behavioural parameters being directly received as an input (eg. are selected by the user). The additional features of claims 6, 44, 47, 53 and 57 therefore correspond to the subject-matter of independent claim 29 and as such cannot contribute an inventive step for the reasons given in section 3.2 above.
  - 5.4. The additional features of claims 7-12, 14, 45 and 46 relating to providing nodes associated with functions which operate on parameter values to modify the behaviour of an object in accordance with moods or personality traits are known from D2 (see eg. figure 1 and table 1).



- 5.5. The features added by claims 13, 22 and 54 relate to inferring parameter values from reverse mapping of direct user input of behavioural characteristics and as such corresponds to the subject-matter of independent claim 31. Therefore, the additional features of claims 13, 22 and 54 cannot contribute an inventive step for the reasons given in section 3.3 above.
- 5.6. The additional features of claims 15-21, 33 and 43 relate to the animation and appearance of the virtual object and are known from D1 (page 2, lines 27-32; page 23, lines 29-32; page 29, lines 6-8) and D2 (figures 3 and 4).
- 5.7. The additional features of claims 23-25, 27, 38, 49, 55 and 56 relate to whether the input to the virtual object comes from software, eg. other virtual objects with which the virtual object is to interact or from a human user, and as such are known from D2 (section 1. Introduction, lines 1-8; fig.s 1 and 4) and D1 (for claim 49 refer to page 7, line 22 - page 8, line 1).
- 5.8. The additional feature of claim 26 cannot contribute an inventive step. The precise algorithms used in D2, section 3.2, for determining the change of parameter values would be chosen by a person skilled in the art, according to the desired behaviour model. It would be obvious to the person skilled in the art to incorporate determining the average of a plurality of inputs in the algorithms of section 3.2, D2.
- 5.9. The additional features of claims 28, 50 and 51 relate to mapping behaviour consistent with a first predefined culture to behaviour consistent with a second predefined culture. D2, for example, teaches generating **appropriate** behaviour for a virtual avatar depending upon input behaviour. It is clear that the motions representing a behavioural characteristic will be selected to be appropriate for the intended viewer's cultural group. In a realistic situation, the technical professional would receive information of the culture-specific gestures which should be incorporated for a specific demographic group (i.e. for a Japanese market) as part of the task information given to him by a non-technical superior. He would be required to insert this information into eg. table 2. (D2, page 115). A technical person would routinely implement into the arrangement of D2 the necessary technical means for user customisation, thereby arriving at the subject-matter of claims 28, 50 and 51, which is therefore obvious.

- 5.10. The additional features of claims 30, 36 and 37 relate to the nature of parameters and functions in the frame work and are known from D1 (page 12, lines 15-27; page 19, line 20 - page 20, line 4) and D2 (page 114, left column, first paragraph and section 3.2, page 115).
- 5.11. The additional features of claims 39, 40, 41, 48 and 52 can also not contribute an inventive step. Documents D1 and D2 both relate to controlling a virtual object in a virtual environment. However, it would be well within the normal skill of a person skilled in the art to apply the same behaviour control programs to a robotic object or real toy. D4 is an example of a system in which such a behaviour control is applied to a robotic toy without exercising inventive skill (see D4, paragraphs [0077] - [0081]).
- 5.12. Claims 58, 59 & 61 - 66 (D2, section 1. Introduction lines 1-8), claim 60 (D1, page 2, lines 18-20) relate to devices, computer program products, networks and platforms implementing the arrangements of claims 1-41 and so do not involve an inventive step for the reasons given above in relation to claims 1-41.